PATENT SPECIFICATION

630,981

No. 34672/46.



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PROVISIONAL SPECIFICATION.

Improvements in and relating to Compositions for Ignition of Combustible

Gas Producing Charges of We, PERCY ALFRED HARRY GOLDSMITH, a British subject, of Ardenlea, Preston Lane, Faversham, in the County of Kent, and HRATERS LIMITED, a Company registered under the laws of Great Britain, of 20, Copthall Avenue, London, E.C.2, do hereby declare the nature of this invention to be as follows:—

This invention relates to compositions for ignition of combustible gas producing charges 10 or heating mixtures of blasting cartridges in which the blasting medium is a non-combustible gas such as carbon dioxide confined under pressure in a container.

In Patent No. 560,227 there is described a composition of the above character comprising an oxidiser, for example potassium perchlorate, and a fuel viz., sodium or potassium salicylate which is in the form of a consolidated mixture having a resistance wire embedded therein or packed in a container of combustible material in close contact with a resistance wire could be employed as a primer for igniting a gas producing charge and the composition could include an endothermic salt to prevent ignition

25 in air at ordinary temperatures.
The object of the present invention is to provide improved compositions for the above purpose and according to the present invention the composition comprises a fuel consisting of the combustible organic carbon containing compound and an oxygen carrier. The carbon content of the compound should be not less than 1/5 of and not greater than substantially 4/5 of its molecular weight and preferably in amount sufficient to satisfy the oxygen content of the carrier.

The physical properties of the fuel employed are that it is solid at ordinary temperatures and capable of being comminuted to permit intimate 40 admixture with the other constituent or constituents of the mixture; it is non-hygroscopic and sparingly soluble in water and the melting point should be within the range of 60°C. to 220°C. A metal in a finely divided form may also be included in the composition. Specific Examples of compositions which have been tried and found satisfactory are as follows:—

**	4.3	a Millerman		
or Hea	tmg	Mixtures.	2.0/	
Examp	le 1.	Potassium Perchlorate	89%	
•		Stearic Acid	11%	
**	2.	Potassium Perchlorate	86%	5 0
	•	Palmitic	14%	
>>	3.	Potassium Perchiorate	50%	
		Pot. Bi Tartrate	50%	
**	4.	Potassium Perchlorate	75%	
, ·	-1	Cane Sugar	25%	55
17	5.	Potassium Perchlorate	<i>7</i> 5%	
	_	Lactose	25%	
"	6.	Potassium Perchlorate	84%	
		Cellulose	16%	
39 .	7.	Potassium Perchlorate	80%	60
		Pot. Hydrogen Phthalat	e 20%	
.33	8.	Potassium Perchlorate	78.5%	
			21.5%	
"	Q.	Potassium Perchlorate	84%	
	•	Phthalic Anhydride	16%	65
From	the	foregoing it will be un	derstood	
that the	tuel :	may be a tatty acid, a s	att or a	
dibasic	acid.	a carbohydrate, a sal	t of an	
aromatic	acid	or an anhydride of an	aromatic	
acid.				70
It has l	been:	found that the salts usuall	y render	

It has been found that the saits usually render the mixture more exothermic and somewhat more sensitive. In this respect, the potassium salts appear to be most suitable although other metal salts, for example, of Barium, Strontium, 75 may be employed.

In intimate admixture with Potassium Perchlorate, by careful sizing and mixing, any of the above fuels yield an igniting mixture capable of initiating a heating or gas-producing charge such as described in Specifications Nos.

413,823 or 480,330.

While a two-component mixture, consisting of Potassium Perchlorate and a single fuel may be employed, a proportion of two fuels could be 85

employed.

If it is desired to render the composition such that it will not sustain its own combustion in free air, an endothermic salt which can yield a large gas volume can be added. The proportion of the endothermic salt to be admixed depends on the rate of decomposition and the heat values of the particular oxidiser-fuel mixture and these factors are influenced by the

[Price 2/-]

carbon from	at and by the rate of reacti	on of the	Example 5. Potassium Perchlorate 60%
	the fuel with the oxygen		
	erchlorate: a larger propo		
	ild normally have to be u		
o a more sens	itive or more readily deco mixture. These salts sho	mposible	
	erchlorate and the fuels, and only sparingly soluble i		7
	of compositions according		
10 formation str	tement which have been t	ried and	Ammonium Oxalate 25% Other endothermic salts may be employed,
found satisfa			examples of which are zinc sulphate and sodium
TOURG SAUSIA	ctory, arc.—		bicarbonate.
Evample T	Potassium Perchlorate	63%	The two kinds of priming mixture can be
Lampic 1.	Palmitic Acid	12%	employed in manufacture of igniting means
	Ammonium Oxalate	25%	known in the art, viz., as a dry powder, filled
15 " 2.	Potassium Perchlorate	45%	into paper containers, or as a consolidated mix-
<u></u>	Pot. Bitartrate	45%	ture in the form of a fuse or match head.
_	Ammonium Oxalate	10%	Either device will have a fuse wire which will
" 3.	Potassium Perchlorate	54%	give a maximum amount of heat consistent
J -	Cane Sugar	18%	with its strength and it has been found that a
0	Ammonium Oxalate	28%	nickel chrome wire of a resistance of
" 4.	Potassium Perchlorate	54%	1,500/2,000 ohms per yard is the most suitable.
•	Lactose	18%	Dated this 22nd day of November, 1946.
	Ammonium Ozalate	28%	MARKS & CLERK.
	COMPLET	E SPE	ECIFICATION.
mmaramant			positions for Ignition of Combustible
mbroxemene	Cos Brodrein's Cl	bondon	on Useting Minteres
	Gas Producing Cl		or Heating Mixtures.
	ALFRED HARRY GOLDSI		in amount sufficient or substantially sufficient to
	ct, of Ardenlea, Preston		satisfy the available oxygen content of the per- chlorate, the compound being non-hygroscopic, 80
	in the County of Ken	nictored	solid at ordinary temperatures and capable of
	IMITED, a Company re ws of Great Britain, of 20	Copt	being comminuted to permit intimate admixture
	London, E.C.2, do hereby		with the perchlorate, the mixture being in the
	this invention and in what		form of a match head or contained in a com-
	be performed, to be part		bustible container either form having a fuse 90
described and	ascertained in and by the		wire embedded in the mixture. A metal in a
5 ing statement			finely divided form may also be included as a
This inven	tion relates to composition	ons for	constituent of the mixture.
	mbustible gas producing		Specific examples of mixtures which have
	ttures of blasting cartridges		been tried and found satisfactory are as 95
	h the blasting medium is		follows:—
	as such as carbon dioxide o	onnnea	Example 1. Potassium Perchlorate 89%
	e in a container.	2. 1.	Stearic Acid 11%
In British I	Patent No. 560,227 there	is de-	" 2. Potassium Perchlorate 86% Palmitic Acid 14% 10
scribed a con	position of the above ch	aracter	
	oxidiser, for example pot		" 3. Potassium Perchlorate 50%
			Dot P: To
5 perchlorate, an	h man ha a sanalidatad -	assium	Pot. Bi Tartrate 50%
5 perchlorate, an salicylate which	h may be a consolidated n	nixture	" 4. Potassium Perchlorate 75%
perchlorate, an salicylate which in the form of	h may be a consolidated n a match head having a res	nixture istance	" 4. Potassium Perchlorate 75% Cane Sugar 25%
5 perchlorate, an salicylate which in the form of wire embedded	h may be a consolidated of a match head having a res I therein or packed in a con	nixture sistance ntainer	" 4. Potassium Perchlorate 75% Cane Sugar 25% " 5. Potassium Perchlorate 75%, 10
5 perchlorate, an salicylate which in the form of wire embedded of combustible	h may be a consolidated n a match head having a res l-therein or packed in a con e material in close contac	nixture sistance ntainer st with	" 4. Potassium Perchlorate 75% Cane Sugar 25% " 5. Potassium Perchlorate 75%, 10 Lactose 25%
5 perchlorate, an salicylate which in the form of wire embedded of combustible 0 a resistance w	h may be a consolidated n a match head having a res d therein or packed in a con e material in close contact ire which could be emplo	nixture istance ntainer t with yed as	" 4. Potassium Perchlorate 75% Cane Sugar 25% " 5. Potassium Perchlorate 75% 10 Lactose 25% " 6. Potassium Perchlorate 84%
5 perchlorate, an salicylate which in the form of wire embedded of combustible 0 a resistance we a primer for i	h may be a consolidated n a match head having a res d therein or packed in a con- e material in close contac- ire which could be emplo gniting a gas producing	nixture sistance ntainer or with syed as charge	" 4. Potassium Perchlorate 75% Cane Sugar 25% " 5. Potassium Perchlorate 75% 10 Lactose 25% " 6. Potassium Perchlorate 84% Cellulose 16%
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salicylate which in the form of wire embedded of combustible a resistance was a primer for it and the computhermic salt	h may be a consolidated n a match head having a res d therein or packed in a cor- e material in close contac- ire which could be emplo- gniting a gas producing osition could include an to prevent ignition in	nixture istance ntainer t with yed as charge endo-	" 4. Potassium Perchlorate 75% Cane Sugar 25% 5. Potassium Perchlorate 75% Lactose 25% 6. Potassium Perchlorate 84% Cellulose 16% 7. Potassium Perchlorate 80% Pot. Hydrogen Phthalate 20% 116
5 perchlorate, an salicylate which in the form of wire embedded of combustible a resistance we a primer for it and the comp thermic salt ordinary tempo	h may be a consolidated n a match head having a res d therein or packed in a con e material in close contactive which could be emplo gniting a gas producing position could include an to prevent ignition in cratures.	nixture istance ntainer t with yed as charge endo- air at	" 4. Potassium Perchlorate 75% Cane Sugar 25% 5. Potassium Perchlorate 75% Lactose 25% 6. Potassium Perchlorate 84% Cellulose 16% 7. Potassium Perchlorate 80% Pot. Hydrogen Phthalate 20% 8. Potassium Perchlorate 78.5%
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5 perchlorate, an salicylate which in the form of wire embedded of combustible of a resistance where the company thermic salt ordinary tempt or the object of wide improved and the composition of the comp	h may be a consolidated not a match head having a rest of therein or packed in a context of the material in close contact ire which could be employed gniting a gas producing cosition could include an to prevent ignition in cratures. If the present invention is a composition for the coording to the present invention in a comprises a combustible of the present invention is a composition of the coording to the present invention in the comprises a combustible of the present invention is a comprises a combustible of the present invention is a composition of the present invention in the present invention is a composition of the present invention in the present invention in the present invention is a composition of the present invention in t	nixture istance ntainer tt with yed as charge endo- air at to pro- above ention organic	" 4. Potassium Perchlorate 75% Cane Sugar 25% " 5. Potassium Perchlorate 75% Lactose 25% " 6. Potassium Perchlorate 84% Cellulose 16% " 7. Potassium Perchlorate 80% Pot. Hydrogen Phthalate 20% 116 " 8. Potassium Perchlorate 78.5% Potassium Benzoate 21.5% " 9. Potassium Perchlorate 84% Phthalic Anhydride 16% " 10. Potassium Perchlorate 87% 116
5 perchlorate, an salicylate which in the form of wire embedded of combustible of a resistance where the company thermic salt ordinary temporate o	h may be a consolidated not a match head having a rest therein or packed in a core in material in close contact in the material in composition in the compositions for the coording to the present invention is a composition to the present invention in the coording to the present invention in comprises a combustible of the composition and potential in the composition and	nixture istance ntainer tt with yed as charge endo- air at to pro- above rention organic assium	" 4. Potassium Perchlorate 75% Cane Sugar 25% 5. Potassium Perchlorate 75% Lactose 25% 6. Potassium Perchlorate 84% Cellulose 16% 7. Potassium Perchlorate 80% Pot. Hydrogen Phthalate 20% 8. Potassium Perchlorate 78.5% Potassium Benzoate 21.5% 9. Potassium Perchlorate 84% Phthalic Anhydride 16%
salicylate which in the form of wire embedded of combustible a resistance was a primer for it and the computermic salt ordinary temporary temporary to the improved purpose and at the composition carbon-contains of perchlorate, the	h may be a consolidated not a match head having a rest of therein or packed in a core in a material in close contact in a context of the material in close contact in a context of the prevent ignition in cratures. In the present invention is a composition to the present invention in a comprise a combustible of the corrolling to the present invention is a composition of the present invention in a comprise a combustible of the compound and pote carbon content of the com	nixture istance ntainer t with yyed as charge endo- air at to pro- above ention organic assium pound	" 4. Potassium Perchlorate 75% Cane Sugar 25% " 5. Potassium Perchlorate 75% Lactose 25% " 6. Potassium Perchlorate 84% Cellulose 16% " 7. Potassium Perchlorate 80% Pot. Hydrogen Phthalate 20% 110 " 8. Potassium Perchlorate 78.5% Potassium Benzoate 21.5% " 9. Potassium Perchlorate 84% Phthalic Anhydride 16% " 10. Potassium Perchlorate 875, 116 " 11. Potassium Perchlorate 875, 116 " 11. Potassium Perchlorate 84% Metaldehyde 16%
salicylate which in the form of wire embedded of combustible of a resistance was primer for it and the computermic salt ordinary temporal ordinary the composition perchlorate, the being not less that the following temporal ordinary temporal ordin	h may be a consolidated not a match head having a rest therein or packed in a core in material in close contact in the material in composition in the compositions for the coording to the present invention is a composition to the present invention in the coording to the present invention in comprises a combustible of the composition and potential in the composition and	nixture istance ntainer it with yyed as charge endo- air at to pro- above ention proganic assium pound r than	" 4. Potassium Perchlorate 75% Cane Sugar 25% " 5. Potassium Perchlorate 75% Lactose 25% " 6. Potassium Perchlorate 84% Cellulose 16% " 7. Potassium Perchlorate 80% Pot. Hydrogen Phthalate 20% " 8. Potassium Perchlorate 78.5% Potassium Perchlorate 21.5% 9. Potassium Perchlorate 84% Phthalic Anhydride 16% " 10. Potassium Perchlorate 87% Thymol 13% " 11. Potassium Perchlorate 84%

the fuel may be a fatty acid, a salt of a dibasic organic acid, a carbohydrate, a salt of an aromatic acid or an anhydride of an aromatic acid, a phenol or an aldehyde. It has been 5 found that the salts usually render the mixture more exothermic and somewhat more sensitive. In this respect, the potassium salts appear to be most suitable although other metal salts, for example, of barium or strontium, may be em-10 ployed.

In intimate admixture with potassium perchlorate, by careful sizing and mixing, any of the above fuels yield an igniting mixture capable of initiating a heating or gas-producing 15 charge such as described in British Specifications

Nos. 413,823 or 480,330.

While a two-component mixture, consisting of potassium perchlorate and a single fuel ma be employed, a proportion of two fuels could

20 be employed.

If it is desired to render the composition such that it will not sustain its own combustion in free air, an endothermic salt which can yield The proa large gas volume can be added. portion of the endothermic salt to be admixed depends on the rate of decomposition and the heat values of the particular mixture and these factors are influenced by the melting point and by the rate of reaction of the carbon from the 80 fuel with the oxygen from the potassium perchlorate a larger portion of the endothermic salt would normally have to be used with a more sensitive or more readily decomposible mixture. These endothermic salts should, like potassium perchlorate and the fuels, be nonhygroscopic and only sparingly soluble in water. Examples of compositions according to the

foregoing statement which have been tried and

found satisfactory are:-

40	Example	12.	Potassium Perchlorate	63%
			Palmitic Acid	12%
			Ammonium Oxalate	25%
	** .	13.	Potassium Perchlorate	45%
		_	Potassium Bitartrate	45%
45 ·			Ammonium Oxalate	10%
	**	14.	Potassium Perchlorate	54%
			Cane Sugar	18%
			Ammonium Oxalate	28%
	>>	15.	Potassium Perchlorate	54%
50		-	Lactose	18%
			Ammonium Oxalate	28%
	?? .	16.	Potassium Perchlorate	60%
			Pot. Hydrogen Phthalate	15%
			Ammonium Oxalate	25%
55	"	17.	Potassium Perchlorate	55%
			Pot. Benzoate	15%
			Ammonium Oxalate	30%
	**	18.	Potassium Perchlorate	63%
	•		Phthalic Anhydride	12%
60			Ammonium Oxalate	25%
	1,	19.	Potassium Perchlorate	74%
			Thymol	11%
	•		Ammonium Oxalate	15%

Example 20. Potassium Perchiorate 75:5% Metaldehyde 14.5% 10% Ammonium Oxalate Other endothermic salts may be employed, Examples of which are zinc sulphate and sodium bicarbonate.

The two kinds of priming mixture are em- 70

ployed in manufacture of igniting means known in the art, viz., as a dry powder, filled into paper containers, or as a consolidated mixture

in the form of a fuse or match head. Either device will have a fuse wire which will 75 give a maximum amount of heat consistent with its strength and it has been found that a nickel chrome wire of a resistance within the range of 1,500/2,000 ohms per yard is the most suitable.

Having now particularly described and ascer- 80 tained the nature of our said invention and in what manner the same is to be performed, we

declare that what we claim is:

1. An igniter for combustible gas producing charges or heating mixtures of blasting cart- 85 ridges of the kind described comprising a mixture of a combustible organic carbon compound and potassium perchlorate, the carbon content of the carbon compound being not less than 1/5 of and not greater than substantially 90 4/5 of its molecular weight and in amount sufficient or substantially sufficient to satisfy the available oxygen of the perchlorate, the carbon compound being non-hygroscopic, solid at atmospheric temperatures and capable of 95 being comminuted to permit intimate mixture with the perchlorate, the mixure being in the form of a fuse or match head or contained in a combustible container, either form having a fuse wire embedded in the mixture.

2. An igniter as claimed in Claim 1, wherein the mixture also contains metal in a finely divided form.

3. An igniter as claimed in Claim 1, wherein the mixture is according to any one of Examples 105

I to II.

4. An igniter as claimed in Claim 1, wherein the mixture is according to any one of Examples 12 to 20.

5. An igniter as claimed in Claim 1, 2, 3 110 or 4, consolidated in the form of a fuse or match head wherein the fuse wire is of a resistance within the range of 1,500 to 2,000

ohms per yard.

6. An igniter as claimed in Claim 1, com- 115 prising a paper container having therein a mixture according to Claim 1, 2, 3 or 4, the mixture having embedded therein a fuse wire of a resistance within the range of 1,500 to

2,000 ohms per yard.

Dated this 5th day of September, 1947.

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